SERC 2014-2018 Strategic Technical Plan

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5th Annual SERC Sponsor Research Review
February 25, 2014
Georgetown University
Hotel and Conference Center
Washington, DC

www.sercuarc.org
SERC 2014-2018 Technical Plan

• Provide the vehicle to align the SERC Vision and Research Strategy with the Sponsor’s Core funding priorities

• Describe the SERC Vision, the Sponsor’s needs, and the SERC’s response to these needs

• State DoD’s SE research grand challenges and how the SERC will apply core and other funding during 2014-2018 to address them

• Provide a multi-year roadmap of research programs to support this strategy.
SE and Management Transformation: Affordability and Value in Systems

Summary: Create, validate, and transition MPTs to make better decisions on affordability and value in systems, particularly for non-functional requirements or -ilities.

Status:
- Tradespace and affordability analysis foundations
  - More precise ility definitions and relationships
  - Stakeholder value-based, means-ends relationships
  - ility strategy effects, synergies, conflicts
  - U. Virginia, MIT, USC
- Next-generation system cost-schedule estimation models
  - Initially for full-coverage space systems (COSATMO)
  - Extendable to other domains
  - USC, AFIT, GaTech, NPS
- Applied iTAP methods, processes, and tools (MPTs)
  - For concurrent cyber-physical-human systems
  - Experimental MPT piloting, evolution, improvement
  - Wayne State, AFIT, GaTech, NPS, Penn State, USC

Impact:
- Engagements with NAVSEA, Army RDECOM on ility tradespace analysis in set-based design, use of GaTech FACT tradespace analysis capability
- Engagements with USAF/SMC, Aerospace Corp., and aerospace companies on definition and development of next-generation, full-coverage space system cost estimation model
- Development and iteration with DoD, industry of initial framework and quantification of ility definitions, stakeholder value-based, means-ends relationships, and ility strategy synergies and conflicts with other ilities
**Human Capital Development: Engineering Capstone Registry**

**Summary:** Building and piloting the infrastructure to affordably scale capstone projects nationwide between 2014 and 2018 and improve how thousands of students are taught engineering across the US.

**Status:**
- Created registry website
- Matched schools and sponsors on 3 projects in pilot year
- Solicited 24 project proposals from sponsors in 2014-2014 academic year
- Identified successful capstone practices

**Impact:**
- Create robust infrastructure to support large-scale involvement of universities, students and organizations
- Integration of systems engineering into engineering curricula

**Stakeholders** propose challenging projects
  - Require systems thinking across multiple disciplines

**Students** volunteer to participate
  - Select their own projects
  - Teams are self-organizing

**Faculty** provide guidance and academic assessment
  - Advise stakeholders on expectations
  - Advise students on plans and methods
  - Assign grades to students

**Pilot 2012-2013 Academic Year**
- **Humanitarian assistance and disaster recovery kit and Dual use ferry**
  - Stevens Institute of Technology, University of Alabama in Huntsville
- **Satellite radiometer**
  - Southern Methodist University, University of Hawaii at Manoa
- **Immersive training system**
  - Missouri University of Science and Technology, University of Hawaii at Manoa
The *Networked* National Resource to further systems research and its impact on issues of national and global significance

*The systems research and impact network*